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RRSP04

The state of Life Sciences, pt 4 -
The future of health and better
patient outcomes with Thorsten
Rall, Capgemini



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(00:00.289) I'm Dave Chapman. Rob. I'm not just saying that for fun. Shall I should we start again, Rob? Yeah yeah, okay, let's start again today. (00:28.194)

I'm Dave Chapman. I'm Robert Cernahan. And this is Realities Remixed, an original podcast from Cap Gemini. And this week we are closing out our mini-series on life sciences by going back over what we've heard from our guests in the last few episodes and examine the final trends that we set out to explore at the beginning of this journey. And joining us today as co-host and semi-guest is Thorsten Rall, who leads life sciences here at Cap Gemini. Thorsten, good to see you again. Good to see you as well. How are you? Perfectly fine. It's Friday, it's sunny, and it's not quite as hot anymore. I mean that's a perfect description of a good Friday afternoon, isn't it? This is the best part of the weekend. All the optimism is all the potentials there. You're not watching Antiques Roadshow on a Sunday. If you live in the UK, you get that little butterfly feeling in the stomach, got to go back to school or work tomorrow. This is peaking. Are you saying this is life? And you're on a great podcast recording talking about a very important subject. I mean, what's not to like? Come on. Bring it home. That's the stars aligning, isn't it? That's the stars. Before before the crushing disappointment of what happens at the rest of your weekend kicks in. Yeah, exactly. By the time you get to Sunday evening, you've gone, well, I wasted that again, didn't I? Add infinite to it. I had so many I had so many plans and ideas. It's that joke like your your peak life is healthy diet, don't drink alcohol, get loads of fresh air and exercise, and that was when I was eight years old. That was it, that was peak. And now it's all downhill. Well, on that note, let's dig in to our final episode on life sciences, Robert. That's a perfect bridge. Mm-hmm. (02:14.958) So let's jump in to the main challenges in the world of life sciences today. So let's remind ourselves a little bit. We talked a bunch over the first three episodes of different things, but I'm gonna set the scene a little bit and then I'm gonna ask Thorsten just to remind us of the main themes and what we've heard so far. So first of all, life sciences today is at a point where old models are stopping working. There's a lot in common there with what's going on in a lot of other industries. but because of what we've heard and the and the position that a lot of life scientists, R and D, sits right at the edge of the possibility of things you can do with AI, that there is a particular drive to change that and breakthroughs are accelerating faster and faster and faster. At the same time as cost pressure, regulatory scrutiny and evidence requirements are increasing, which again, there's a lot in common with other industries. But because of the nature of life sciences, I think it's fair to say it's quite acute here. So so Thorsten, before we get into the main themes, additional to that, what are the what are the what characterizes where we're at at the moment in in the world of life sciences for you? (03:31.31) So I think I I touched on a couple of those points actually in the in the very first episode that we had, right? So generally in life sciences you see Rob slept through that Thorsten, so just for Rob's benefit. That's cheeky dad. Feel free to go back over again. I was riveted. I was riveted. Only for Rob, I will I will repeat them then. So what you what you have at the moment in in life science is actually a quite quite interesting situation. Right. That is I would say unprecedented in the in the industry because on the one hand, from a pure scientific point of view, and we heard about that in a couple of the previous previous episodes, from purely scientific point of view, it's likely the best time at the moment to be a patient in the world, right? So the the number of scientific discoveries, the number of innovation therapies that come up to for treatments that have not been treatable only like a couple of years ago, is is really enormous and super impressive, right? Now, at the same time, yes, the deer the system overall is dealing with a lot of cost pressure, is dealing with the fact that population is actually population balance moves in the wrong direction from a healthcare cost perspective. and you see an increasing scrutiny coming from regulators and governments on curbing those costs now. Much more than was previously the case, and going directly after pharma companies and also meta companies. Now At the same time, and that's more for Western, I would say, market leaders in in the industry, you've seen over the last just literally like five to six years a huge shift of innovation activity going to China or emerging out of China,



right? So while a few years ago in in pharma, you've seen a lot of the I would say compounds coming out of of Chinese biotechs were more or less Me Toos. Now you have for the very first time China actually overcame like the US in the number of new molecular entities that they registered. interesting. and they are much faster both in pharma and in med tech and actually bringing those products to market. Not unlike what China's doing in general manufacturing, is it? Which is it's it's started out as being a cheap alternative and a lagging alternative, and now it's starting to take the lead. (05:52.182) Yes, yes, indeed. And they've also created an environment that allows these companies to move very fast, right? So I'm not gonna go into detail, but essentially what that does is from an innovation perspective, generally the conditions are super strong, but also you have even stronger competition in on innovation than the past. You have more cost pressure than on the past. And yes, you have the promise of new technology coming in. So as an organization, you need to find a way. To cope with this, I don't even want to call it a polarity because actually I don't know what a polarity is when you have three poles. But like this this tension between those three three forces. And on the one hand, unlocking enough investment to be able to capture the potential from from the new technologies, finding the efficiency gains that you actually need to react to the to the threats to your margins coming from the governments, right? And then at the same time, also keep humming your innovation engine, which also requires you to invest quite a lot into MA and so on, right? So for these companies, it's a very interesting reality at the moment and how to cope with that. And what we've seen or what we heard over the last two episodes, I mean they they gave us a bit of a taste of what this looks like both in medical devices when it comes to deeper integration of medical devices into the care flow, how you actually can take use a medical device. To make the experience of the patient and the practitioners in in the practice much better and also reduce waiting times, reduce time to actually get your your diagnostics results. And we also heard about that in in the very first episode on the impact that artificial intelligence has on the drug research. So really compressing the time to bring a new molecule into clinical development from a couple of years to like 18 months or even less, right? I think we also learned a couple of very interesting things on how long people actually can live. Well, that's that's maybe beyond beyond I was saddened to find it won't be forever. In fact, I was also saddened to find it the answer was live a healthy and clean lifestyle. That's what I was saying. It's a double whammy, Dave, isn't It's a double whammy. I'm not gonna live forever and have to be good. Actually not very effective. And and yeah, exactly. It's like there's no cheat. It's like what's the point of all of this thing? I live in the age of (08:09.004) Cheats and easy answers. I was very disappointed to find out that science has not been able to give me that. Is that the conclusion you've drawn? That's my conclusion. So that was life science. That was our episode for today. Thank you very much for listening in. Yeah, yeah, exactly. I think Rob's drawn a line under that. What you excited about doing next, Rob? Living forever. Yeah, and but going back to where we were, so yes. Old models are no longer scaling, changes are required. A different approach is required and and an awful lot of disruption, both in terms of the R and D, as you said, Thorsten, but also in terms of how you know how the you know basic facilities and services to patients are transforming. So the five themes that we set out, the first of the five themes was accelerated R and D. So effective drug discovery, clinical development. The the the thing that really struck me in our conversation with Alex and Silico Thorsten. was his vision of entirely tailor-made drugs. So you could almost via a prompt develop you know, develop a drug that's very specific and custom to the prompt that you put in. What was what was your reflections on that over the course last couple of weeks since we had that conversation? So the the theme of therapies of one, I think is a very, very exciting one. Right. So if you if you can envision a future where you might get a cancer diagnosis and then you're essentially getting your personalized treatment out of your 3D printer that is really, really made for specifically that cancer. Yeah. So you would take you would take the specifics of your diagnosis like in detailed scientific terms, put that into a s into a prompt. What I liked about the

discussion as well this was that He made it very clear of what are the surrounding changes that also have to happen to make that a reality, right? Because I mean, at if you try to do this today, apart from the regulatory challenges, the patient safety challenges, also from the economics of that model, you'll run into a couple of roadblocks. So essentially you need that combination of completely rethinking the the process time it takes to come from, let's say, (10:26.444) Discovering a disease to bringing a working molecule to market, or in this case to an individual patient, you need to break the economic model completely down to actually make that future a reality. But what also struck with me in the discussion was that I believe he provided also a very healthy view on the aspect of patient safety, right? Because you you have often in these discussions, you're forgetting about the fact that you are dealing with People's lives, right? And just because an algorithm tells you this might be a molecule that works, we are still clearly not there yet to really know does it really do what it's supposed to be doing? And and yes, he made the comment of he might take it himself. Of course he didn't do it. He might take it himself if there was like another no other way around it. But for like the broad population, that's something we always have to keep in mind, right? In in the end, this is still About patient safety and delivering drugs and therapies to patients that actually are safe for them to take, because otherwise we are ending up in like the wild, wild west. And you might want to have that in other places, but you definitely don't want to have that when you're when you're dealing with your own health. No, it's very much a a Jurassic Park thing there, isn't there? Which is like just because we could do it, we didn't stop to think whether we should do it sort of situation. But it's Jeff Goldblum. All right, Jeff. I see what you've done that, yeah. Yeah, see, I did that. but like the what struck me is that the nature of the prompt would be extremely important in this case. So it would have to be your detailed biochemistry as well as the diagnosis that you've had. You know, so you're not just going, I have this form of disease, it makes me feel sick on a Tuesday morning, blah, blah, blah. It's not like you're just hacking something together. The prompt, it seemed to me, would have to be. You know, a s scientific diagnosis. But why would we need a prompt? You just monitor up to the eyeballs with telemetry, that auto creates the prompt and you sat at your desk on a Tuesday, a little pill drops out of the container and says, take this and it'll, you know, do XYZ one two three. Take the human out of the loop and just get the system to generate the drug for you. Yeah. I mean he was he was going more for I think a proper proper sequencing. But yeah But when you take when when you take what's going on, right? You know, twenty years ago, if I said you could print (12:51.65) This at home. So we've got 3D printers at home. That concept was like, what? I can produce what at home? This thing that doesn't need to be assembled, it's printed as a whole. You know, there's a whole thing that's opening up there. the concept of translating that down into something like drugs, pharmaceuticals, etc., it's just the next couple of layers of capability that then allow you to create things, isn't it? So the design process is the molecule and then the the the creation process is that. So the idea of having this edge technology to be able to create this. I mean, it it might be a couple of decades out, but it's not inconceivable to say that the same thing that's happened with manufacturing processes was is likely to happen with drug processes. Is it not true? there was doubt there. There was doubt. I mean there there you said a couple of decades. I can say anything can happen in a couple of decades. Now people don't know how old you are and you just said at the beginning that you won't live forever. So the question is will you still be around to to see it or not? Not if I keep going out with Dave, I won't, no. But no, but the the i the I mean the idea of how advanced does technology have to get for this highly personalized thing just to be built into our lives automatically. So you get up in the morning and the supplement's created for you and they said, depending on what we've monitored through your night's sleep, this is what we think you need for today. And then it could be and this is going to protect your health for the future. We've detected early signs of XYZ one, two, three. This is all tailored. Yeah, if it I mean I I think you'll you you'll see question around the time frame, but you'll you'll likely see like a gradual shift of these things, right? I

mean if you're talking about like supplements, those are they might do some good, are like super potent therapies. No, not really. could you see could you see a scenario where of course you can print your your aspirin or something like that at home? Maybe. If you're going into cancer therapy, that is like and and that goes back to Dave's point, right? So for cancer therapy, I don't really foresee a future where we would not have to do a proper screening. You could do the screening at home, right? If you are able to take a biosample, but but still, I mean the I think there will be different different grades of this precision medicine towards what kind of indications and or levels of of disease. So yeah. At the at the end of the day the possibility might be there, but the risk is there for humans. What it reminded me of when we're having the conversation, it reminded me of it again. (15:17.292) just now was Elizabeth Holmes. And, you know, for those who don't know about Elizabeth Holmes, she effectively had created a she was extremely influenced, if I understand this correctly, and I'm I'm taking a lot from the documentaries I've seen on this, so forgive me on on accuracy, but she was extremely inspired by Steve Jobs, apparently, and the the sort of the the technification of the world in the sense of thinking about things as products and being able to release products. And I think her her company, which was called Theranos, developed effectively like a a blood testing device, I think, which was then released like if it was a product. And it was it was I I think cutting a long story short, it was incredibly flawed. And they had pushed, I think, through a load of regulation in a relatively cavalier fashion. I think that's the s the story that we should bear in bear in mind, isn't it, when we think about like how tech and and the medical industry come together. I mean, that brings us back to the to the question on patient safety. So yes. I I agree on I agree on that one. So moving on to our second theme then, which was about patient and software-centric product platforms and the use of that within patient care. And we talked to Pradrang from Philips Healthcare on that. And that was Kind of fascinating because that felt like it was the end of a dream that was set out in things like the NHS's Connecting for Health, which we talked about at the time. And that was about, you know, effectively having the right data in the right place for the end-to-end sort of patient care value stream to use kind of enterprising language to describe effectively what's going on there, which means that a doctor at any point in the patient process Can access the right the relevant information for diagnosis and checking and those sorts of things. What struck you about that one, Thorsten, in terms of where you think it sits against where the industry is at right now? So first I was very impressed by the the level of thinking and depth they've already made put into connecting all the different devices they have in their in their suite, right? and augmenting those to I would say address (17:36.576) On the one hand, very practical challenges for practitioners in the hospitals when it comes to accelerating the workflow, making finding information easier, but at the same time, doing a lot of good for the healthcare system overall, right? Because you're essentially reducing the number of false diagnoses, you're reducing the number of running the same diagnostic three times because data gets lost somewhere in the middle. You're increasing or accelerating the time that or not acceler yeah, you're accelerating, sorry, the time that people get get on therapy that all will have positive health outcomes and actually can can help patients avoid a degradation of their health until they get the the actual therapy. So I think that combination was the the thing that that struck me, right? It's actually it's it's a very practical solution that has a very big impact not only on hospital systems patients, but also on the system overall and can play a significant part to make healthcare more sustainable. And I mean that's what I mentioned at the beginning, right? I mean the pressure in the systems is quite enormous at the moment. So everything you can you can do to essentially take some of that pressure out without having to go into really painful cuts for for people. Yeah, and it it it's it struck me there the similarities that From an underlying tech foundational and architectural perspective, that once you went d down below the layer of kind of what the data is being used for, though there was just a lot of similarities in it, Rob, I think, to general enterprise digital transformation in the sense of data platform, data in the right place, end to end to end process, moving things into a

platform construct. What's what strikes you about that as being transferable across different industries? Yeah, so the when you think about the sorts of science you're doing here, the interconnectedness of the data model, how you transfer that through the processes, et cetera, stop relying on the humans and allow the platform to do a lot of the work for you. I think we've seen a lot of AI inserted into drug discovery. The platform naturally picks up these capabilities and does the undifferentiated heavy lifting for you. So you get the human on the the direction. (19:53.11) And allow the platform to try and control the core of it. That's that's basically the theme that's rising across industry and all sectors, which is take the human away from being in the loop and sticking them on the loop. And then what you end up with is this my expertise is directing the system, but it's doing or removing all the toil of my day to day. So you have more time to do the important things in in in life. That is a strategy that has been rising through tech for a very long time. That's what abstraction gives us. And so It we're just moving into the more complicated spaces from this. Well one of the big things that is quite interesting though is as we enter in the next epoch of computing and the intelligence era, the application of AI and agentic into this type of field could be very significant. So with with drug discovery and how it's processed, etc., novel approaches to how we think about this setup is apparent. It's nascent in its yes. It's one of the industries that really picked it up quickly because it has a really high impact. But there's a long way to go in what that technology can actually use the word. I mean, riding high. Riding high, Rob. I mean I mean that's a good sentence, isn't it? Should have. Riding high. I almost used the word novel as well. Nascent novel and epoch. I mean, that's a good sen I'll save that one up. I'll save that one up. I mean it was magnificent. You're just jealous of my excellent vocabulary, David. On that on that note, let's move on to theme three. Now, theme three, we were going to have a look at manufacturing and supply chains in this space. Of course, like many organizations, all the stuff has to be made and supplied. So you you you generally focus on the drugs and the patients, but the operation of the wider industry around it needs to care and concern itself about the similar sort of things again that you see. multiple other industries. So I'm talking about things like resilience, particularly in a geopolitically complex world. I'm talking about quality, sustainability and compliance. Toss them what are the big what are the big threads in this space that you're seeing that's specific to life sciences? Yeah, so before I go into specific threats, maybe just one one quick reminder, because in in pharma, of course everybody's always talking about R D, right? Which is of course super important. (22:09.174) Yeah. But in the end, if your operations don't work, you don't get any drugs. It's as simple as that. And I think in during the pandemic, I mean, we've we've seen what happens if if the supply chains don't work necessarily as predicted, if you're really running out of medication. And that's that's where this part becomes so critically important, right? So people people sometimes forget about that. So but let me let me talk about a couple of the specific threats here. So In manufacturing, you actually see a reflection of the broader trends in a different shape, right? So on the on the one hand, you have the the requirement in manufacturing, because it is not the innovation engine, to consistently find ways to better make better use of the budget and the capacity and resources it currently has, right? Which means reducing stock you have while not jeopardizing availability of drug in the market. Which means becoming at the same time more resilient against external shocks in the current environment. And that's actually true for pharma and for medtech. But on the flip side, with the innovation that's coming to market, actually the complexity of the individual molecule and also the complexity overall when it comes to the production of the portfolio of a specific pharma company keeps increasing, right? So if you if you have to develop, I mean As everybody might be able to imagine, like if you're doing like a simple small chemical molecule, this is a chemical, classical chemical process. Right? If you go into most cancer therapies, you're dealing with biologics, you're dealing with biological processes completely different, much harder to predict what's actually happening. If you're going into cell and gene therapy, again, completely different. If you go into combination therapies or drug antibody conjugates, Completely

different technology to manufacture. So the complexity that those operations teams need to deal with is actually increasing at the same time. They need to bring their costs down. Now that's not like a very easy thing to do. And if you put on top of that in the geopolitical context, the need to bring your production closer to where you want to sell, that means that you also have to stomach huge capex expensive. (24:29.206) Right. So if you look at the the announcements, I think overall we are now around three hundred and seventy billion US dollars that have been announced as capital investments into the US to set up new manufacturing capacity. Now setting setting up a a manufacturing facility in pharma production. Is like a process of several years, right? Because you need to find for for several reasons. Of course, you need to go through all the different regulatory qualifications that actually your site is operate is is able to operate in in in in that environment. But also when you're producing a specific drug, you need to be able to prove that you can consistently produce the drug that you are supposed to be producing at exactly the quality parameters that have been set during the development process. Right. Now you might think that's relatively straightforward. But the big ch but the big challenge I mean, number one, as you can already guess, it's actually not, otherwise I wouldn't have made the comment. But one one big thing to keep in mind is that in development you're operating at small batch sizes, right? So you're producing relatively small volumes, and you need to find a way to increase the volume that you're producing quite dramatically. And that means that the process parameters actually change, right? Because in both biologics and chemical processes, scale-dependent parameters are not scaling linearly, right? So essentially that's a lot of experimentation that needs to go on. And that means often it takes 12 months, more than 12 months, just to translate an existing therapy from the production size from the development size batch to the production size batch. Now, if you have to do that more often, or have to do it when you are Sa setting up a new site, let's say in the US or also in Europe, that is a a huge process complexity that comes with it and a huge expense. And actually, in the end, if you're not managing to do it, that means your drug doesn't get to market. Right. So what what companies are investing in from a technology perspective is finding ways to make this production setup. I don't want to say I mean, usually the industry talks about it making it more autonomous. Now that does not mean that everything runs completely on its own. (26:46.552) But it means that you're essentially having much more predictive, much more predictiveness in the system when it comes to running operations, identifying bottlenecks in existing production, but also more predictiveness when it comes to transferring from development to at scale manufacturing to predict what actually the future at scale process needs to look like for the drug to meet the parameters that it has to meet. and that comes with a lot of of challenges, but I but I stop here for a second just to give you time to react. Well well one one thing that you said in there that I thought was interesting, which is the investment particularly in the US for I'm guessing reonshoring manufacturing of things, which is typical for the politic that's going on at the moment. and and what's what strikes me here is that even if you wanted to re onshore the I don't know, the manufacturing of mobile phones, the the issue you've got is not just one of building the facilities and then getting things up and running, it's actually finding workforces and finding expertise that is pa is perhaps no longer exists. If it did exist, it was maybe twenty years ago that those things existed. And it it seems to me that that pharmaceutical manufacturing is going to be held to even higher grades of of of regulation. So the lead time on that is is going to be significant. So I think again For me, it's like you can see the I think you see the read across into the challenges of multiple other different industries and particularly manufacturing in this case. but yeah, w with the higher regulatory requirement around it. Yeah, so that's that's definitely and and that's actually a point that is true both for the workforce to run the site. Now, the way you would run a newly built site today, I mean, I don't want to say it's the same as in in a car factory. Proportionally a lot less. The number of people that you would need for a site to run today is not exactly the same that you needed like 25 years ago.

but still, right? I mean, you you have the capacity in the market that you usually have for what's being produced in the market. But it's also true for having the people to actually set up the site. Because setting up the site is equally (29:02.23) a very specialized like very specialized process. And if you if you have this like huge amount of investments and new sites being built at a given time, you're just like maxing out capacity, right? So it's almost I mean it's it's almost if you if you go like if you compare it to like normal real estate. If all of a sudden you would like quadruple or quintuple the the number of houses that you're building in a city. I mean first thing you would see is of course that the Builders would jump jack up their prices, but at some point there will just not be enough people that can that can build houses. It's as simple as that. Do you remember the conversation we had with Microsoft Alistair Spears, who was head of infrastructure? He's the one building the data center capacity for them. And he went into this world of the setup is a completely different capability. So the ability to create capability is quite a different discipline to then running and manufacturing and sticking all the processes. Through it. There's a parallel there which says there's an entire sub industry exploding because of the need of this extra capability. And it brings into conversations about the cost of doing that, the unit of power, all this sort of stuff, the economics behind it, then suddenly become quite important when you think about it. So the the the some countries are suffering a very high price point on energy, which is a good leading indicator of the likely success of that economy. And so there's all this that has to play into it as well. But Then sovereignty kicks in to say, well, we want the capability close to us, so we have the resilience in the supply chain. And there's all these factors coming together that create quite a difficult environment to work out what to do, because this isn't small investment, this is significant. So so yeah, it's it's a complicated old game we play. I don't I now I don't want to leave you thinking this is like all like doom and gloom because there's it's also a couple of there's a gu I mean it's like What's wrong with you? Everything's terrible and complicated. That's how architects But it is, it is all terrible. Unfortunately. A lot of Which is a which is unusual, because when you're sitting up in an ivory tower looking down on stuff, it looks easier, doesn't it? Normally. Hey, Dave, I'll oversimplify when it's convenient. Thank you very much. No, so I think I think there are a couple of of interesting developments though in in the more recent past that actually helped the industry cope with those challenges, right? Because (31:24.79) If you look at it, one of the foundational complexities you have specifically in manufacturing is that each site historically has been built differently, right? So very much specific to whatever the site lead, setting up the site thought was the best way to do it, maybe a little bit like car factories back in the days. But that complexity historically led to a huge challenge when you actually try to automate anything or roll out any analytic tools across, right? Because pretty much every deployment was almost starting from zero. So you you took e you developed an algorithm on site one, you went to site two, different ontology, different data sources, different process definitions. So you had to do it all over again. Now the problem is if you're running, if you're doing this in an in a function that is more, I would say, cost conscious than maybe other parts of the value chain, you don't get the ROI that you need to show. For these investments to actually pay for themselves. Now, what has changed over the last couple of years is that with the advances we've made in on the on the data platform side, we can now develop almost like abstraction layers that sit on top of that complexity, right? And most people, well, maybe not. A lot of people that listening to this podcast have likely heard the term semantic layers, but essentially developing a semantic layer that translates data. into context in the business, right? So to make this very, very concrete, to translate, let's say, a sensor readout at the shop floor, which tells you actually you have like a temperature exceed of 1.5 degrees Celsius. If you have that information, it's not very useful, right? Because you only know a sensor told you you have 1.5 degrees Celsius exceeded. You don't know on what batch, you don't know on which site, you don't know on which machine You don't know where in the process concretely. And that means with that information, there's very little you can do, right? It's just like a data point. So

you don't even know whether it's a problem unless there is something semantically telling you that 1.5 degrees is a problem. So with a semantic layer, essentially it helps you translate this data point in conjunction with other data points into okay, actually on batch ABC there was an exceeding temperature. (33:51.126) In that step that came along with a quality report previously saying why, which actually helps you identify is that a consistent issue, yes or no. And that's when information or data becomes contextually relevant and actionable on the site level. Now that semantic layer allows you to implement that logic much more easily from site to site and also for the whole network. And that takes a lot of the burden away and also makes some of the I mean, I'm not saying that tech transfer is easy by no means, but at least it helps you to address some of that complexity and also accelerate the process, for example, for a new gr new site setup. and that is a big change compared to just a couple of years ago. Well, let's let's move the conversation on a little bit. We we talked when we talked to Pradrang about kind of in facility patient experience that was being fostered by new joined up platforms. Let's talk for a little bit about channel based experience for patients. So on the outside, you know, you might be you might have a mobile phone, you might have an app. how are healthcare professionals interacting with us on our apps? And how is that becoming more digital, more data driven? I guess in the middle of all of that you have some fairly standard software like CRM software. But how is it how close are we do you think Torsten to having a joined up remote digital experience for this stuff. I think we touched in the first episode about wearables. And but how does that come together with actual real treatment, do you think? That's a that's a good question. I'm not gonna go back to Rob saying it will happen at some point in the future. Which is which is true. But but here's what we what we actually see happening over the last actually two years mostly. And that is a a much more patient-centric approach to bringing medication to the market. And what I mean by that is historically the patients, as you say, they had their apps that are used for, let's say, adherence. So reminders of you have to take your medicine. Some apps like the Apple Apple devices, they helped you also exchange some of the health information with your with your HCP, but it was always still a relatively fragmented, fragmented system. And I think one of the big reasons (36:14.488) For this was actually that when you look at the individual stakeholders, no individual stakeholder had a really, really, really convincing incentive to kind of like close this into one single experience. And I mean, I'm not gonna go into the details of like how individuals are being paid in the healthcare system, but I think that was one of the big challenges. Now, what we've seen over the last two years, with the advent of mostly GLP ones, and I think I mentioned that. Before. So essentially GLP wants the the famous drug glass that is used in obesity treatment. You've essentially seen the shift from a classical pharma approach to market to almost like consumer market. Because all of a sudden patients are taking a much more active role. Patients often also take a much more active role in paying for the medication, to be honest, than in in in many other in many other indications. And that gives an incentive to bring the The patient experience really end to end together. And if you look at the industry at the moment, you do have platforms that essentially allow a patient to self-identify, depending on the market. Also, that piece can be helped or not. But that's let's say generally, self-identify or being identified. Then getting support to actually getting a tailor consult to be diagnosed or not diagnosed, then automatically being checked on. Coverage by insurance, yes or no, being eligible for co-payments, yes or no, getting the script, directly being channeled to the to the e-pharmacy that then ships the drug to your home. As you're already in the system, you're being onboarded on the patient program that essentially checks in on whether you have any side effects that would essentially make make you potentially like skip the the treatment or finish the treatment, right? And that's really the first time that you have, and and a lot of those journeys at the moment are actually orchestrated by the pharma companies behind it. And that's really the first time that you've seen that consistency, like literally end-to-end, on creating an experience for patients that is almost seamless. Now, do we have the same across

therapies? Unfortunately not. And anybody who has family or friends or or whatever who like (38:40.342) Have a severe disease suffering from cancer, likely know the experience that when you're entering the system, the experience for the patient is everything but connected, right? I mean, even simple things as managing proactively side effects in a more, I would say, permanent and timely manner is something that's not happening. So, but this being said, I think with With the systems for obesity being set up now, I mean, I'm hopeful that we see actually a better integration also into other therapeutic areas in in that space. I've seen also and done some work actually with some health insurance companies that are trying to leverage the data they've got to create a a seamless upfront patient experience. And that might be easy access to advice or easy access to GPs or health checks or whatever. And when you yeah, when you start to connect those sort of experiences to wearables and precautions and then all the way through to treatment paths and to those sort of platform experiences in hospitals. You can begin to see a picture of of of a very transformed industry, I think. But let's look at the fifth theme though, to try and frame that a little bit. Actually I I wanna make another point before you move on to the fifth theme. Because I think there is There is one additional quite interesting thing happening at the moment, right? Historically, when you when you look into the engagement model of pharma companies, most of the historic engagement has been like pharma company talks to a physician. Now we've been talking a lot about agentic AI and agents, right? And we've been talking a lot about like how industries and enterprises are using those agents more and more as orchestration. Layers for information consumption and also when deciding what information is being shown. Now you can quite easily foresee a future where exactly the same thing is actually happening in the in the provider systems, right? So as opposed to having a direct connection to an HCP or like a physician or nurse or somebody else, you actually have an information layer that sits in between that first reads, let's assume an email you send to the to the physician. (40:59.67) Scans the contact and the physician just asks for, hey, I'm interested in drug ABC. And the information layer or the agent sitting on that layer actually decides what information is being shown. And that creates a completely different engagement problem or opportunity for pharma companies going forward. And how they need to think about what kind of information they can provide, also what kind of information they still can provide in face-to-face or Just at least like one to one inter interactions that is not easily available already previously. and how to how to integrate into that system, I think, is a very, very important shift that we see at the moment. I mean, in its in this infancy. But personally I believe that will be quite transformative as well for for the overall engagement model. So that's not so much about the patient. This is more about the traditional engagement route that pharma has been taking for the last decades. But just Just playing that back to the conversation we had earlier about the parallels with industry, the world that we're describing needs a a data ontology that aligns to you. And then the interaction layer goes over the top. Yeah. So at the moment, my my patient data is stored in multiple silos all over the place over a number of interactions I've had over my life. That data model and the ontology around it should really live with me and I should own it. And then I can grant access to that. when the physician needs it or the healthcare provider needs it or the pharmaceutical company needs it or if I want to submit my data for research purposes. But that should be a thing I own. And at the moment the system owns it. And again, it's a thing that's rising in society, especially around your circumstances as an individual. I should be born and my data set about me should be mine. And it feels like when we get to that point, then I get the choice and then the agents can go over the top and then it can all be interacted around it. At the moment the system's almost tail wagging the dog with my data being dispersed and owned by somebody else and I have no control over it. So at the moment I'm in the UK, the NHS owns my data set. That's it. I very difficult for me to access it. I can go through an app, but I don't own the control over it. And I it feels like that shift would help create the world that you describe. Well let's talk about digital core and actual architecture that could sit underneath this. That's a good bridge into it, Rob. So

again, there's a lot of commonality when you look at the underlying foundational layers, I think. (43:20.738) Because you look at, you know, core systems of record, some form of data layer, some form of semantic layer, an agentic layer, and then, you know, sort of humans, patience at the top of that layer is a is it is an emerging pattern, I think, for sort of modern scaled AI deployed enterprises. I guess Tarsen, one, does that resonate in this industry? And we talked about the semantic layer earlier on in the conversation. And why that's it's important. And then more recently in the end of that description of patient experience, you're talking about how the kind of agents and humans will interact at the top of that. What's missing in it? Any any variations on that stack for you when you look at life sciences? So not so much on the stack itself. I think one one or two aspects that might be more weighted than in in in other other industries, right? I mean you you mentioned semantic layer and One has to keep in mind that the semantic layer in in life sciences is really, really specific. Right. So and and people often underestimate that component, to be honest, right? I mentioned I mentioned the semantic layer for for pharma manufacturing. For to develop a pharma manufacturing semantic layer, that is a big piece of work with like thousands of of connections. And and having the expertise to translate, because the challenge is really translating the business reality into the data, right? Requires a very specific skill set. Because if you have somebody who's really good at data products, it's not going to help you much. If you have somebody who's like really good only at process, it doesn't help you much. You need people that actually understand how to make the connection between, okay, that is what you say in the business, and this is where you find it in the systems. To build that semantic layer. So that's one. And that's that's very specific. The second one is on the on the control plane that I think you you mentioned. But of course, for pharma and also medtech, and we had it in the in the discussion with with Phillips. The question around GXP is super, super important, right? So, how do you actually ensure that you are operating within the parameters of compliance and y that you are compliant also with guidelines being given by the regulator? (45:43.148) Right. So in the Metech space, you have very clear regulations that tell you what kind of AI you're allowed to use where and what kind of AI you're not allowed to use in in certain systems. Right. So for I mean, to make it specific, if you're talking about a GXP critical component in your manufacturing process, there is just no way you can introduce a self learning algorithm into that process step. Okay. So if you so that's the first one. And you have to bake into that control layer these different logic points to actually be able to showcase to when in time in terms of your in case you're audited that you're complying and that you can able you're able to show that your op agents are actually operating within that parameter consistently. And that is that is one piece with all the potential that comes with the GENTIC. This is one piece that the industry at the moment is grabbling with a lot, right? How do you actually scale a gentic in a GXP environment? And that's also the reason why we see a lot of activity or a lot of publications on research. Because research is kind of like earlier, right? So you don't have to worry about that so much. As soon as you're going into clinical development manufacturing, you're entering GXP territory and then things become much more complicated. I think the other thing To consider in the model is if we do get a personal data model, that's eight point three billion systems of record in there, which is the they'll they're all consistent, they all look the same. But what is the ontology we should have with that? And then everybody should have their own, so it lives with you. It could be on your watch. So, you know, you're in some foreign country, you have an incident, somebody bumps an NFC on your watch, your whole history downloads, they know how to treat you, things like this. It should come with us 'cause it's about us. So I think that's the other a slightly different change in this model where we need to consider ourselves to be the system a record and it should literally be encoded with us. A little chip under the skin keeps your data records there. Something like that's always with us. I think for me, that's a big shift. But when we get that, then it makes a massive difference to how we operate in health as a as an individual or how we can co c conceive to receive services from

healthcare. You're really into this like biohacking stuff, are you? (48:06.476) Yeah, yeah, yeah. I'm I'm all with that. We we it's it's my data because it's literally about me, so it should live with me. It should be so it at least should be literally inside you. Yeah, yeah, yeah. That that that makes sense. But as you as you talked as you talked about data, that that's maybe another another piece to keep in mind. The the nature of the data in in life science is quite diverse, right? So Most I mean, usually when you think about data, and I guess that's also why you have your your chip, you think about you have like sensor readouts that essentially do step counts to heartbeats and and so on. It's pretty much like signal classical data signals. But if you go into into RD and also clinical, you're dealing with molecule structures, you're dealing with images, you're dealing with videos. You're dealing and and not videos that are easily understandable, right? I mean, you're dealing with videos of tissue, which is hard to train if you don't have tissue video material, right? So it's not like Google car view. And and that's also something that makes this whole notion of creating the database so complex, right? And easily findable. Because if you if you go into molecular structures, it's actually not easy for a machine to read molecular structures. Well, one of the things that that AI is definitely going to help with it, isn't it? I I saw somebody recently, I think it might have been a chap who runs NVIDIA. I can't remember who it was. But he would say this, of course. He was talking about, you know, fields, scientific fields that might get wiped out from a yeah a kind of an AI perspective. And radiology was one of them in the sense of, you know, AI can be far more accurate and far more consistent in in reading charts like that. So the same thing Presumably would apply to the data set more widely, wouldn't it? You might have a data set that Robert's carrying in his chip that's embedded in his cheek. Where do you want your chip embedded, Robert? Just under I'll just do it in the hand, thank you. In your hand. In your hand so you I don't want anybody scanning. Yeah, no, I know. It just it just just under the just under the skin would be cool. So let's say the hand. So Robert goes into a GP and (50:21.204) And in Costa Rica and needs a readout. Surely that that there is a there is a version of this where it can be instantly read by a series of agents that would be like multimodal information that you're carrying on your chip. Yeah. Yeah, that's it's all there. All my scans, all my history, everything. So and then the agent just reads it all, I gets my recent biometric data from all the tracking I've got. And then it says, right, we we already know what's wrong with you is a is a pill that they print for me because that's gonna happen, isn't it, though? Thirty years time in the premier. But it's that it's that instant but then the point is if I'm properly connected, I'm in Costa Rica, my system realizes I need support before I do, and has already arranged all this for me through my health agent that's contacted it Sent the data, got the answer, and my prescriptions come through and the pharmacist has already got it and it's delivering it to my hotel room. So you didn't even have to go in to get examined, is that what you're saying? I just get up and a bloke hands me a bag of pills at the door in my hotel. What are these five? But but Dave, to to your point on the images, I mean, that's actually very in because I had a a similar discussion but with a different angle. So the the radiology image diagnostics, yes, I mean that's kind of like the The thing to start. And one of the reasons for that is that radiology images have a very big advantage. They actually come with a lot of data annotated to them, right? So you actually know what you're looking at, you know where in the body you're looking at it, and you're producing like hundreds of thousands of those images, right? So there's a lot of like material to learn from. It's a different than I and now I say what I the discussion I had. I actually had a discussion with a person that is using video material from endoscopic surgery to essentially allow people to drive more complex surgery in remote places, right? Because you have like, I mean, it's it's not an easy thing. Now the the the challenge is if you do like endoscopic surgery, you have a video of something somewhere inside of your body. You don't know exactly where, plus every human inside looks a little bit different, right? (52:36.94) So you you essentially you you're showing the machine something where you say, This is like a surgery on colon cancer. How do you contextualize that, right? So and translating that that complexity of information then into an algorithm that

actually helps people to take the right decision because you don't know. If you cut right, you might actually cut something open that is lethal, right? If you don't know where in the body you are. So it's a in and and that is I I think it's always this piece, and that's coming back to this context, right? Translating information into context is super, super important. If you have context from the beginning, a rich context, it's easy. If you don't have a lot of context, it's much more difficult. Well, look, what a portrait. So over the course of the last few episodes of the mini series and then a little bit today, we've tried to paint a picture of not only what's happening today, but some of the challenges as well as the vision for the future, which might be closer than we think. Maybe to just to wrap us up, Thorsten, maybe what were the what were the the couple of things that surprised you in the conversation that you maybe weren't expecting going into the exploration? So I clearly learned a lot about the impact of current medication on length of life. There was something I really did not know. Yeah, like how are actually not prolonging your life, at least the the the the wide wide spectrum of them. I also I also was positively surprised by the advancements we have made in integrating medical devices into workflow and connecting medical devices. Because I think what a lot of people experience in their day-to-day Does not necessarily reflect where the industry already is. Now, which also tells you something about how broadly those technologies are being adopted in the healthcare system. But I found it was very good to know that the technology is there, right? And it's more a question of how can you create the right incentives to deploy this more broadly. (54:54.412)

Now we end every episode of this podcast by asking our guests what they're excited about doing next. And this week it is our co-host Thorsten. What are you excited about doing next? Or in the world of life sciences, having heard everything over the last few episodes, what excites you professionally about the next the opportunity of the next few years? So I'm gonna tell you what excites me personally, privately, and then what pr what excites me professionally. So Personally, you won't believe it, but I'm again barbecuing tonight, just as in first episode. Excellent. No joke. Yay! a barbecue. Sorry, we need to check this. This is a survey we're doing. Gas or charcoal? It's actually like a smoker, but it's it's it's it's not so smoker. That's but that's not that that's not the point of Personally I'm more excited about my daughter having her theater performance tomorrow that she's been practicing for a lot. So that's very good. That's what I'm looking forward to a lot. What what's she gonna be performing in? I'm not I'm I'm I don't know if I'm allowed to reveal that, but it has something to do with Harry Potter. Okay. But I'm not I'm not I'm not allowed to say Parry Hotter because they don't have the copyright, so they have to actually change the names. Harry Plopper. No. Gar Gary Potter. Gary Potter. The So you have to cut that out, otherwise I'll be sued. Beep then. Profess professionally, professionally, I mean, we're working at the moment on a couple of really exciting topics around on the one hand, on the on the research and development side, bringing GXP compliant agents into the development, which personally I I'm very much looking forward to because I hope that it can really now compress the timeline for for clinical. but also on the operations front. I mean, a lot of the the pieces I I mentioned on on semantics is gaining a lot of traction. (56:57.802) And for me it feels it feels like after like one and a half decades of a lot of promise, we are now like entering the phase of actual reality and and real impact. Very good. Well look, Thorsten, and in the and in the background supporting us, Gert-Jan, who's been co producing this a bit with Marcel in the background and helping us manage through some Some tricky guest logistics sometimes. So thank you for that. And Thorsten, thank you for joining us and just illuminating what is one of the more important industries. It's been a real pleasure talking to you. Likewise. Thank you very much.

If you would like to discuss any of the issues on this week's show and how they might impact you and your business, please get in touch with us at realities remixed at capgemini.com. We are all on LinkedIn and we'd love to hear from you, so feel free to connect and DM if you have

questions for the show to tackle. And of course, please rate and subscribe, our podcast. It really helps us improve the show. A huge thanks to Thorsten, our sound and editing wizard Ben and Louis, our producer Marcel and Gert-Jan, and of course to all our listeners. See you in another reality next week.

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